



Shellfish Toxics Monitoring in New Jersey Estuarine Waters

Bob Connell
NJDEP, Water Monitoring & Standards
Presented at: NJ Water Monitoring Council
Meeting
September 27, 2006

Value of Molluscan Shellfish as an Indicator

- Sessile – representative of their immediate location
- Filter feeders – integrate water quality conditions and concentrate certain pollutants

Recent Molluscan Shellfish Monitoring Efforts in NJ

- Mussel Watch (NOAA)
- NJDEP – NY/NJ Harbor Area (EPA Region 2 RGI Grant)
- NJDEP – Atlantic Co. & Cape May Co. (EPA EMPACT Grant)
- NJDEP – Statewide (EPA – Supplemental 106 Grant)

Criteria Applied to Molluscan Shellfish

- Regulated under the National Shellfish Sanitation Program (NSSP)
- Criteria and guidance levels are provided by the US Food & Drug Administration and are published in the NSSP's Guide for the Control of Molluscan Shellfish.

**Table 1 — Action Levels, Tolerances and Other Values for
Poisonous or Deleterious Substances in Seafood^a**

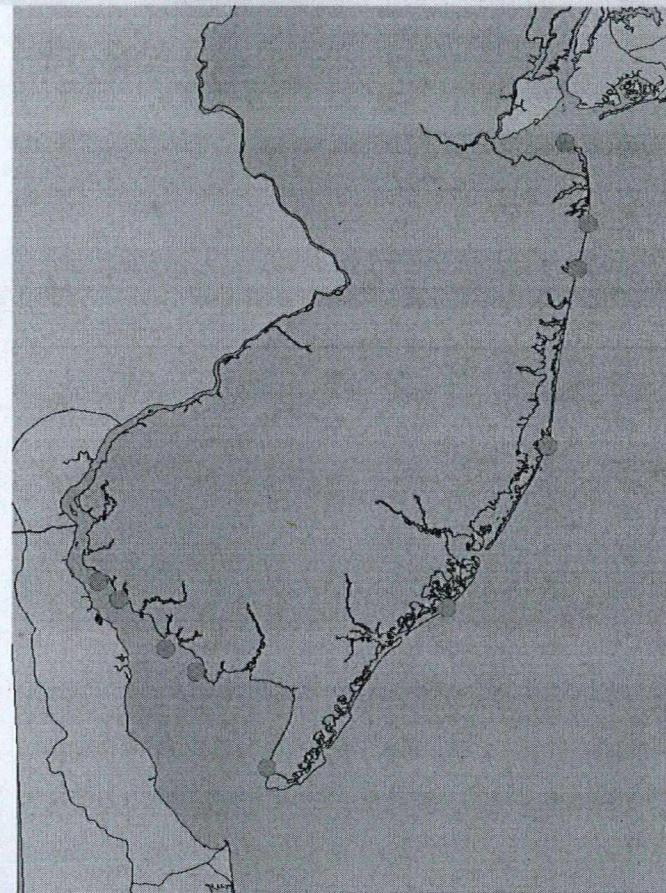
<u>Deleterious Substance</u>	<u>Level</u>	<u>Food Commodity^b</u>	<u>Reference</u>
Aldrin/Dieldrin ^d	0.3 ppm	Fish (edible portion)	CPG 7141.01-B.1 ^c
Chlordane	0.3 ppm	Fish (edible portion)	CPG 7141.01-B.3 ^c
Chlordecone ^e	0.3 ppm	Fish (edible portion)	CPG 7141.01-B.4 ^c
	0.4 ppm	Crabmeat	
DDT, DDE, TDE ^f	5.0 ppm	Fish (edible portion)	CPG 7141.01-B.5 ^c
Heptachlor/ Heptachlor Epoxide ^g	0.3 ppm	Fish (edible portion)	CPG 7141.01-B.9 ^c
Mercury ^h	1.0 ppm	Fish, Shellfish, Crustaceans, other aquatic animals. Fresh, Frozen or processed.	CPG 7108.07 ^c
Mirex	0.1 ppm	Fish and Shellfish (edible portion)	CPG 7141.01-B.11 ^c
Paralytic Shellfish Poison	80 µg/100g	Oysters, Mussels and Clams (Fresh, Frozen and canned)	CPG 7108.20 ^c

**Table 1 — Action Levels, Tolerances and Other Values for
Poisonous or Deleterious Substances in Seafood^a**

<u>Deleterious Substance</u>	<u>Level</u>	<u>Food Commodity^b</u>	<u>Reference</u>
Polychlorinated Biphenyls (PCBs) ⁱ	2.0 ppm	Fish and Shellfish (edible portion)	21 CFR 109.30
Neurotoxic Shellfish Poison	20 mouse units/100g	Shellfish meats	APHA Recom. Procedures (17)
Heavy Metals, including arsenic, cadmium, chromium, lead, and nickel	See FDA Guidance Documents (References)		

Mussel Watch in NJ

Location	Statewide (estuarine)
Species	<i>M. edulis</i> <i>C. virginica</i>
Timeframe	1986 - present
Funding	NOAA



Mussel Watch Data (1986-97)

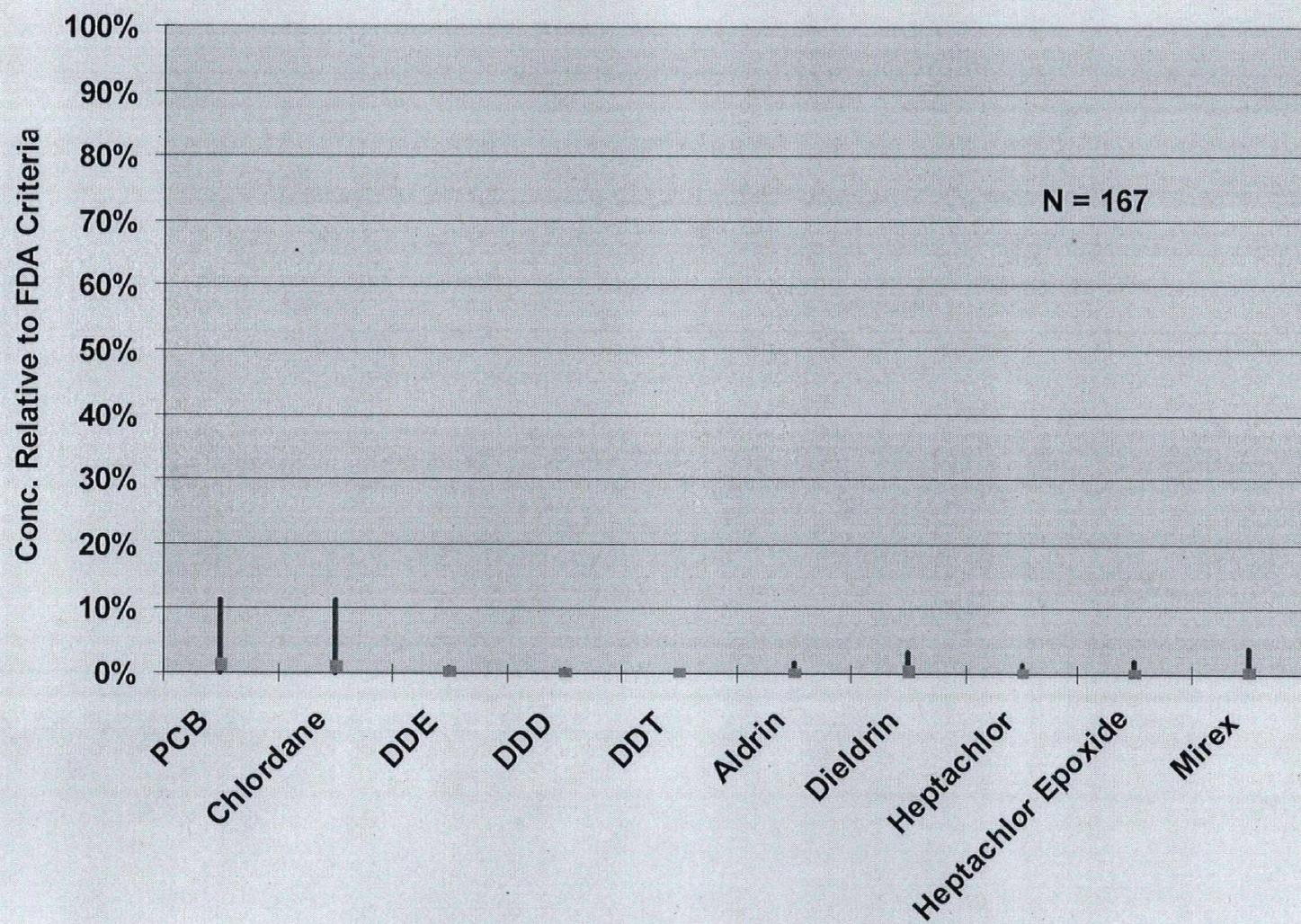
As Percent of FDA Criteria

NJ Waters

Aldrin	Dieldrin	Heptachlor	Heptachlor Epoxy	Mirex	
0.08%	0.46%	0.04%	0.10%	0.19%	
0.00%	0.00%	0.00%	0.00%	0.00%	
1.82%	3.27%	1.29%	2.10%	3.99%	
167	167	167	167	167	

	Aldrin	Dieldrin	Heptachlor	Heptachlor Epoxy	Mirex
Mean	0%	0%	0%	0%	0%
Minimum	0%	0%	0%	0%	0%
Maximum	2%	3%	1%	2%	4%
N	167	167	167	167	167

Mussel Watch Data (1986-97) As Percent of FDA Criteria NJ Waters



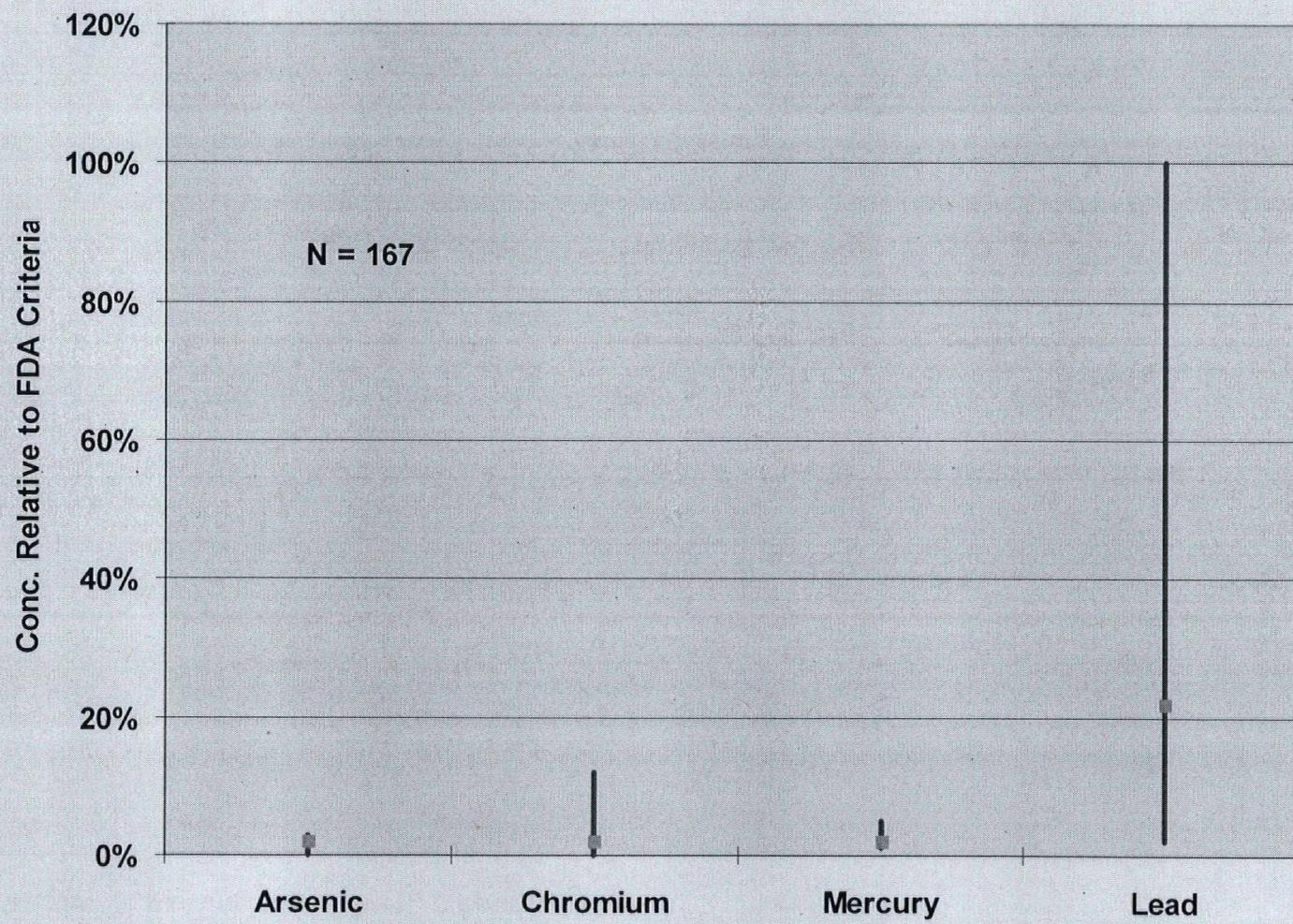
Mussel Watch Data (1986-97)

As Percent of FDA Criteria

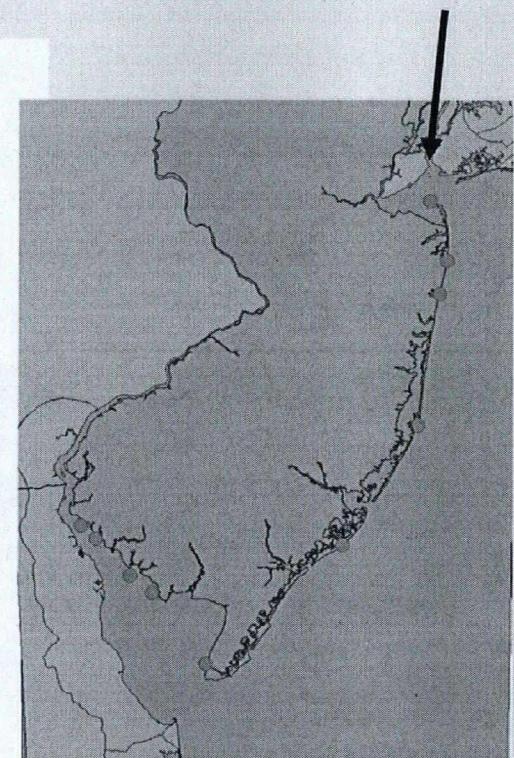
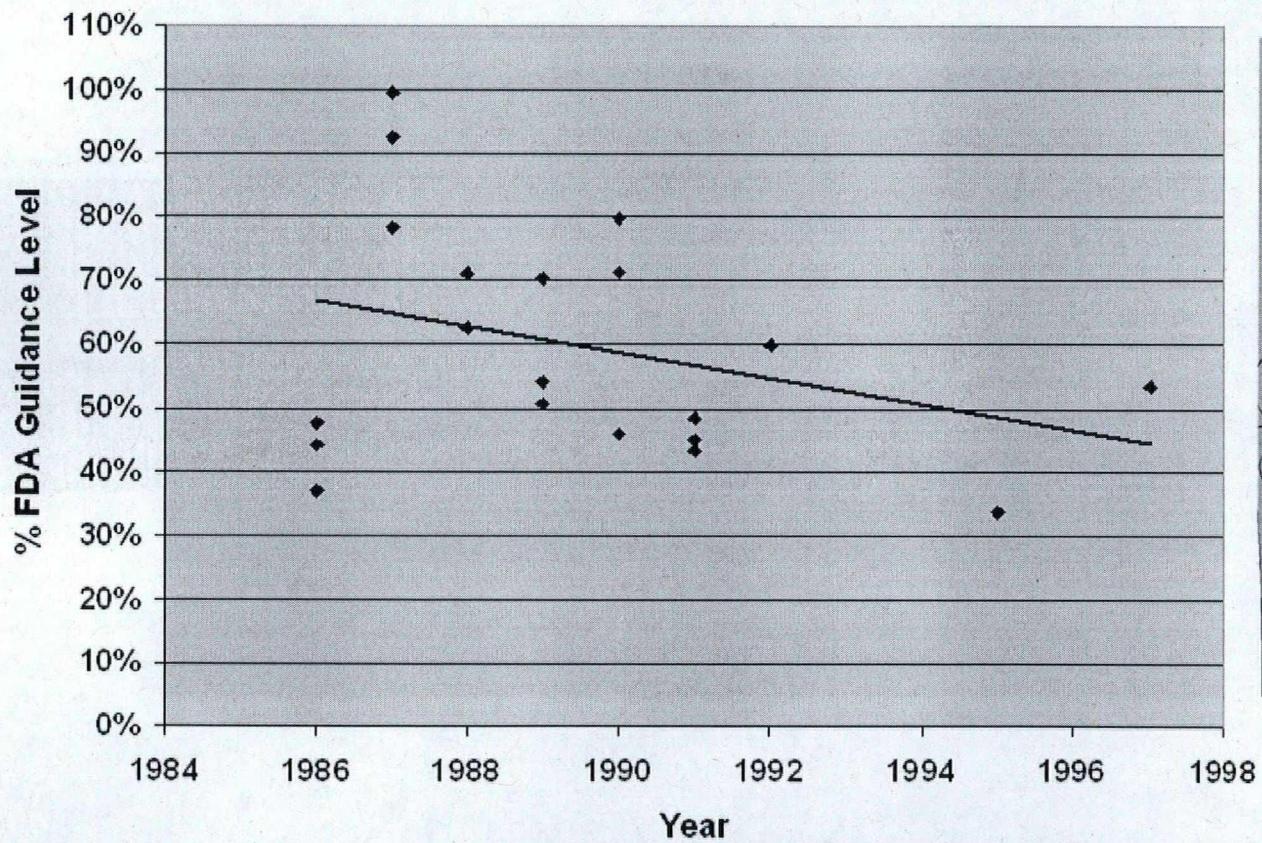
NJ Waters

Parameter	Mean	Min	Max	N
As	2%	0%	3%	166
Cr	2%	0%	12%	166
Hg	2%	1%	5%	166
Pb	22%	2%	100%	166

Mussel Watch Data (1986-97) As Percent of FDA Criteria NJ Waters

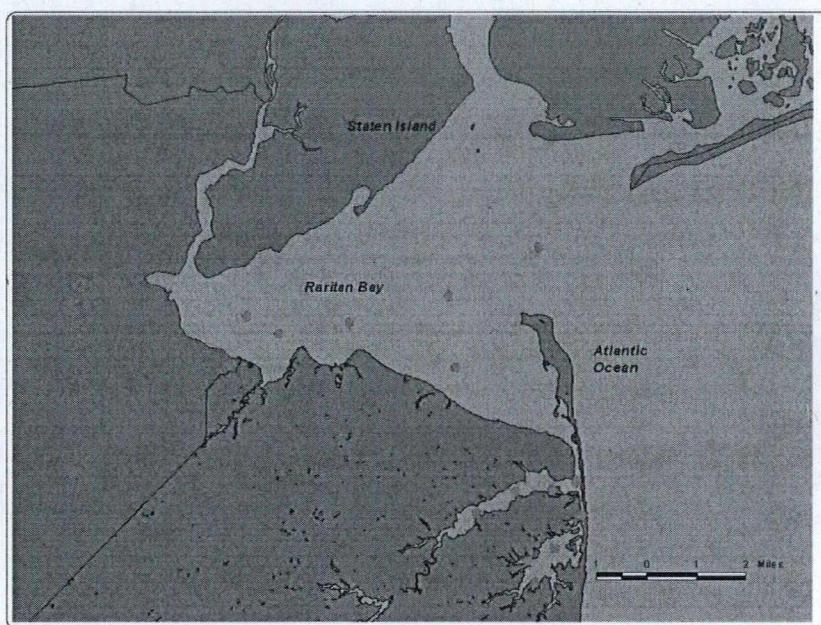


Mussel Watch Lead Levels North of Sandy Hook



NJDEP Raritan Bay

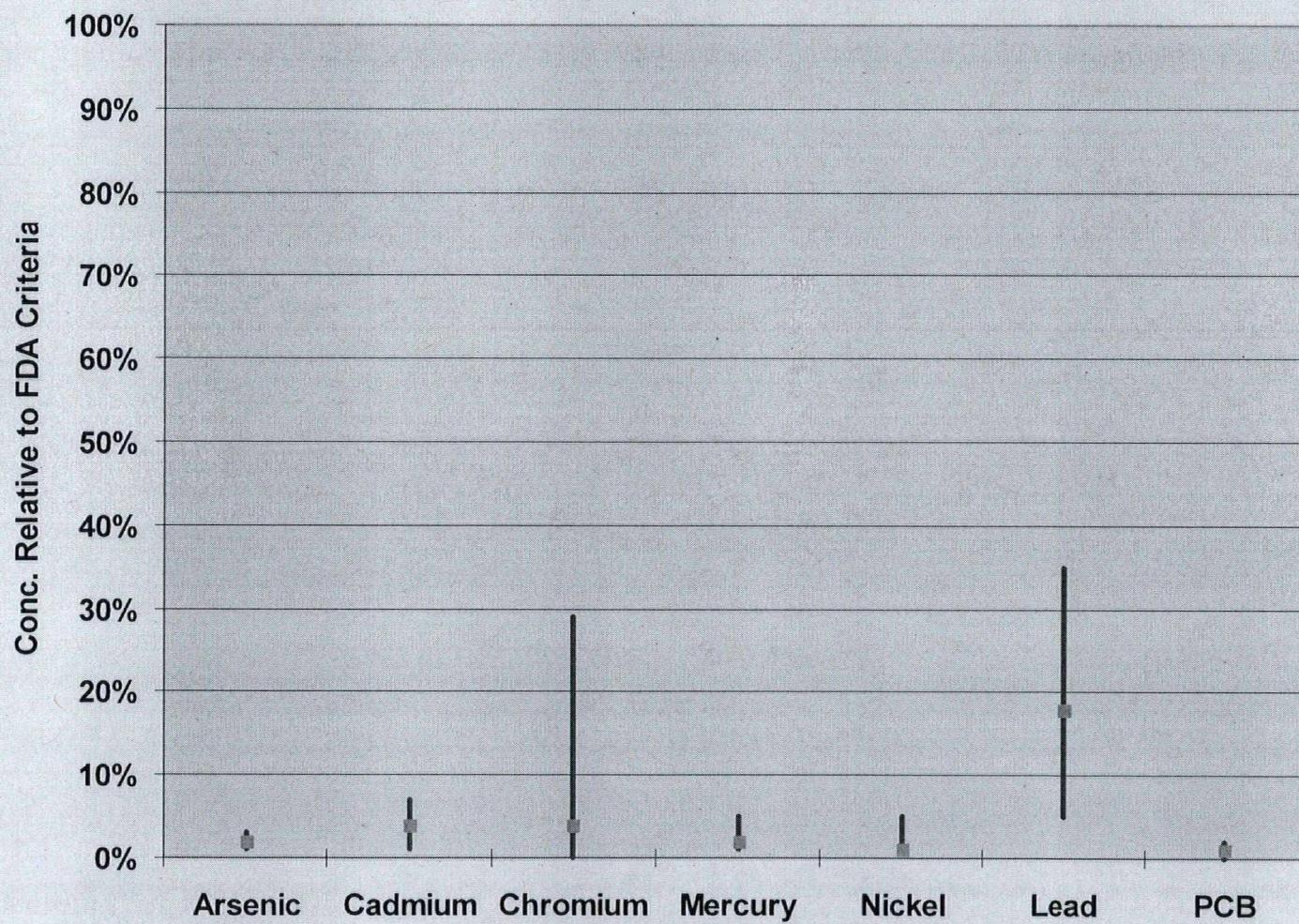
Location	Raritan/ Sandy Hook Bay
Species	<i>M. mercenaria</i>
Timeframe	1999 - 2000
Funding	USEPA Region 2



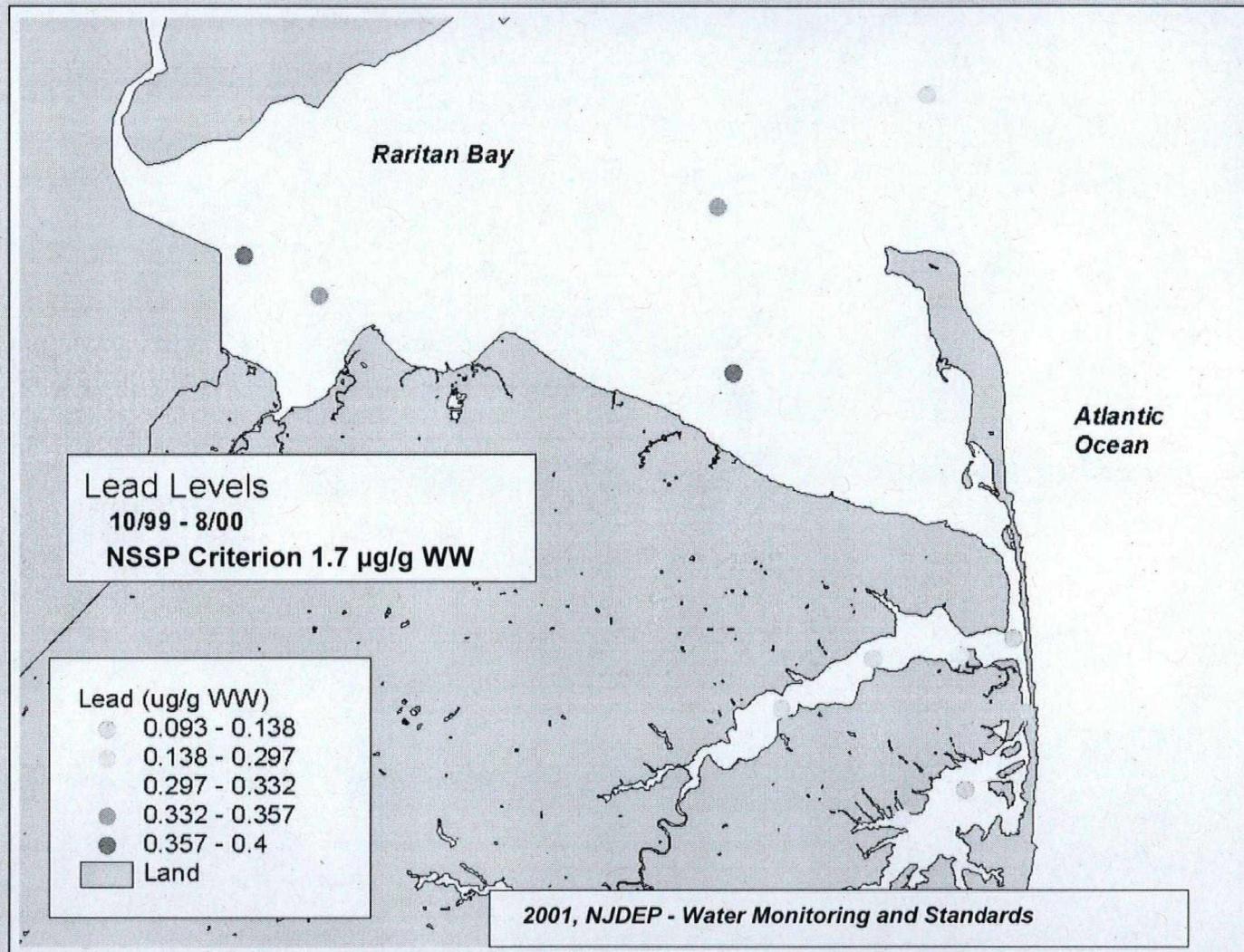
NJDEP (1999-2000)
As Percent of FDA Criteria
Raritan Bay & Sandy Hook Bay

Parameter	Mean	Min	Max	N
As	2%	1%	3%	32
Cd	4%	1%	7%	32
Cr	4%	0%	29%	32
Hg	2%	1%	5%	32
Ni	1%	1%	5%	32
Pb	18%	5%	35%	32
PCB	1%	0%	2%	32

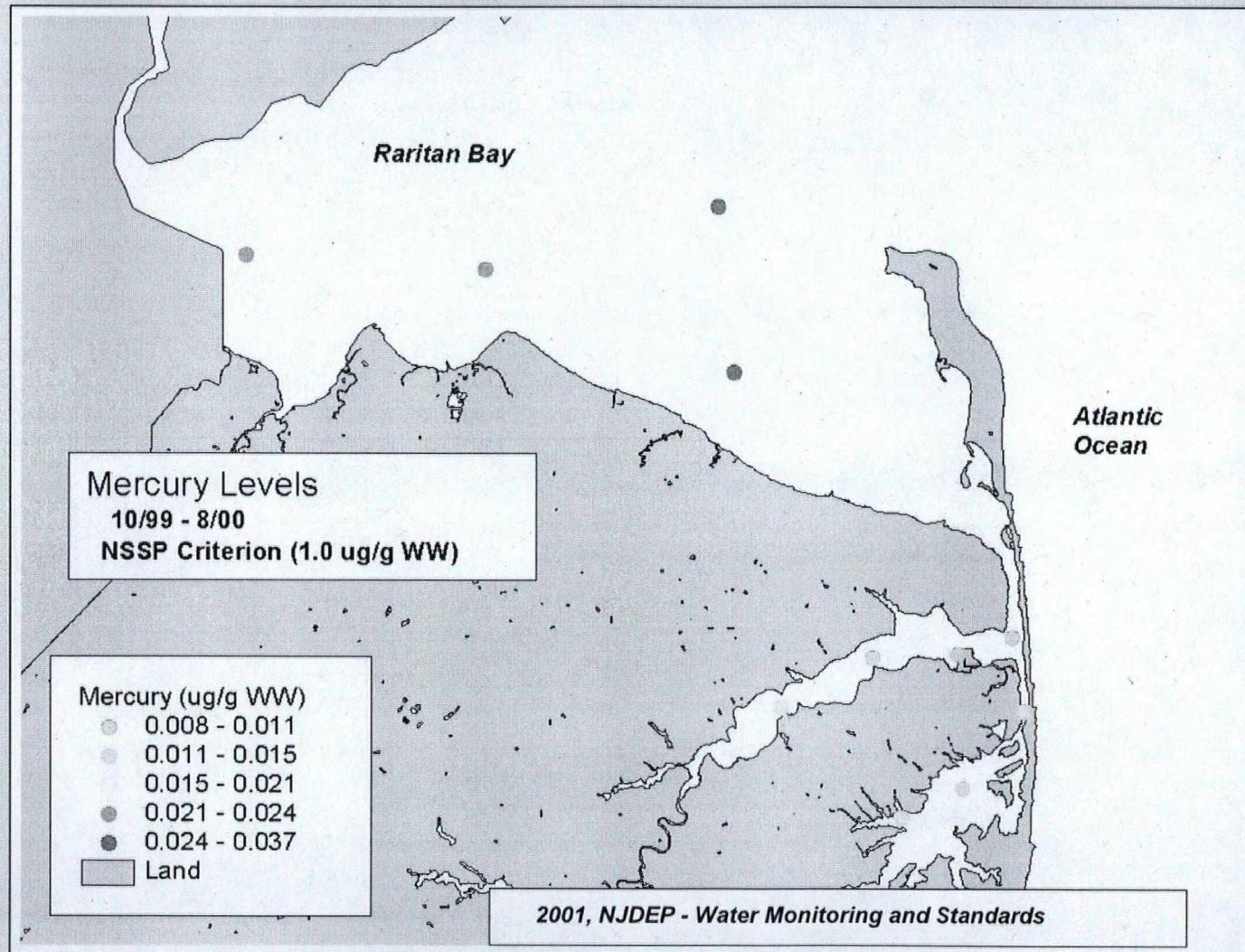
NJDEP (1999-2000)
As Percent of FDA Criteria
Raritan Bay & Sandy Hook Bay



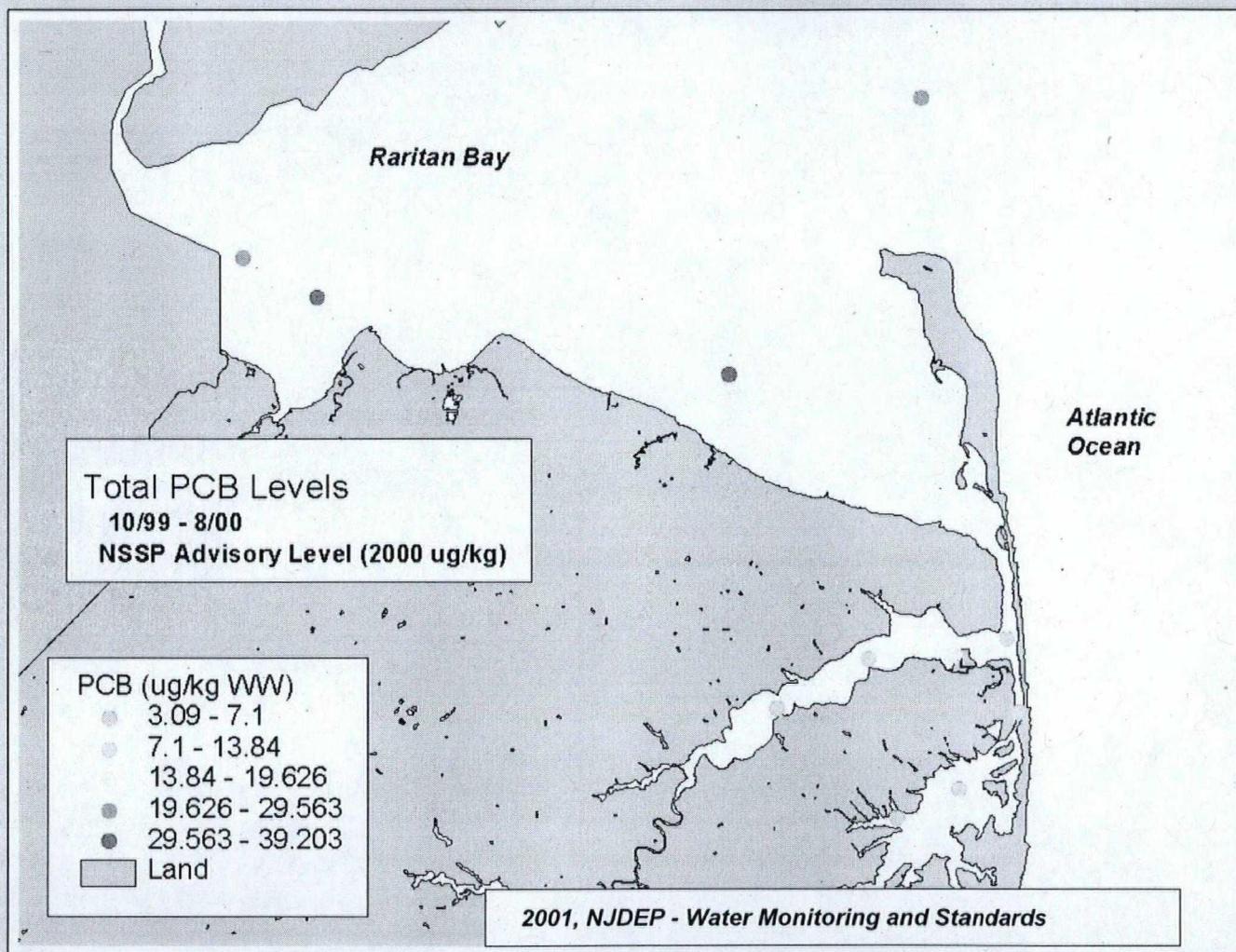
Lead in Hard Clams



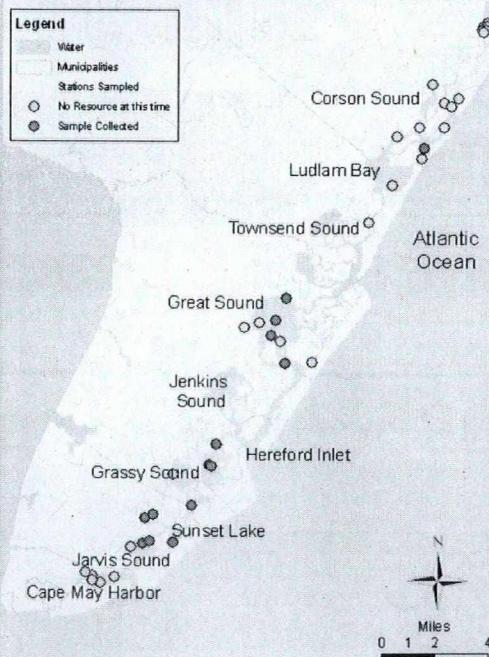
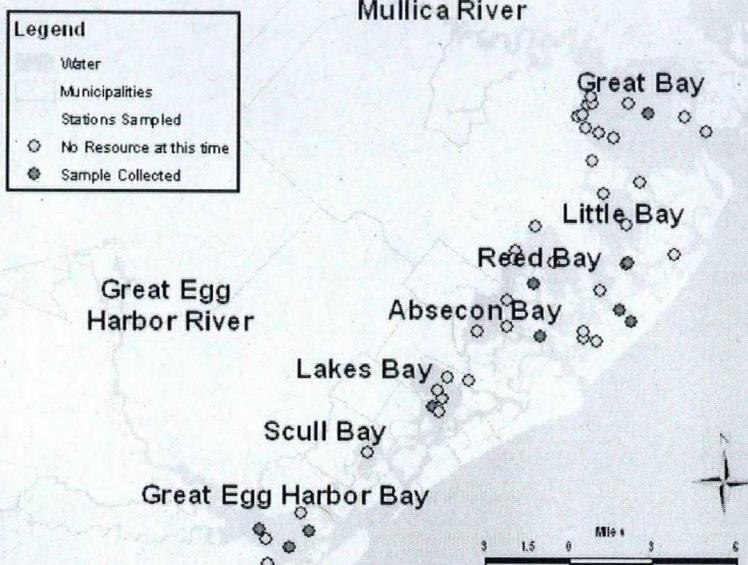
Mercury in Hard Clams



PCB's in Hard Clams



EMPACT Program



Location	Atlantic & Cape May Counties
Species	<i>M. mercenaria</i>
Time Frame	2004 - 2005
Funding	USEPA EMPACT

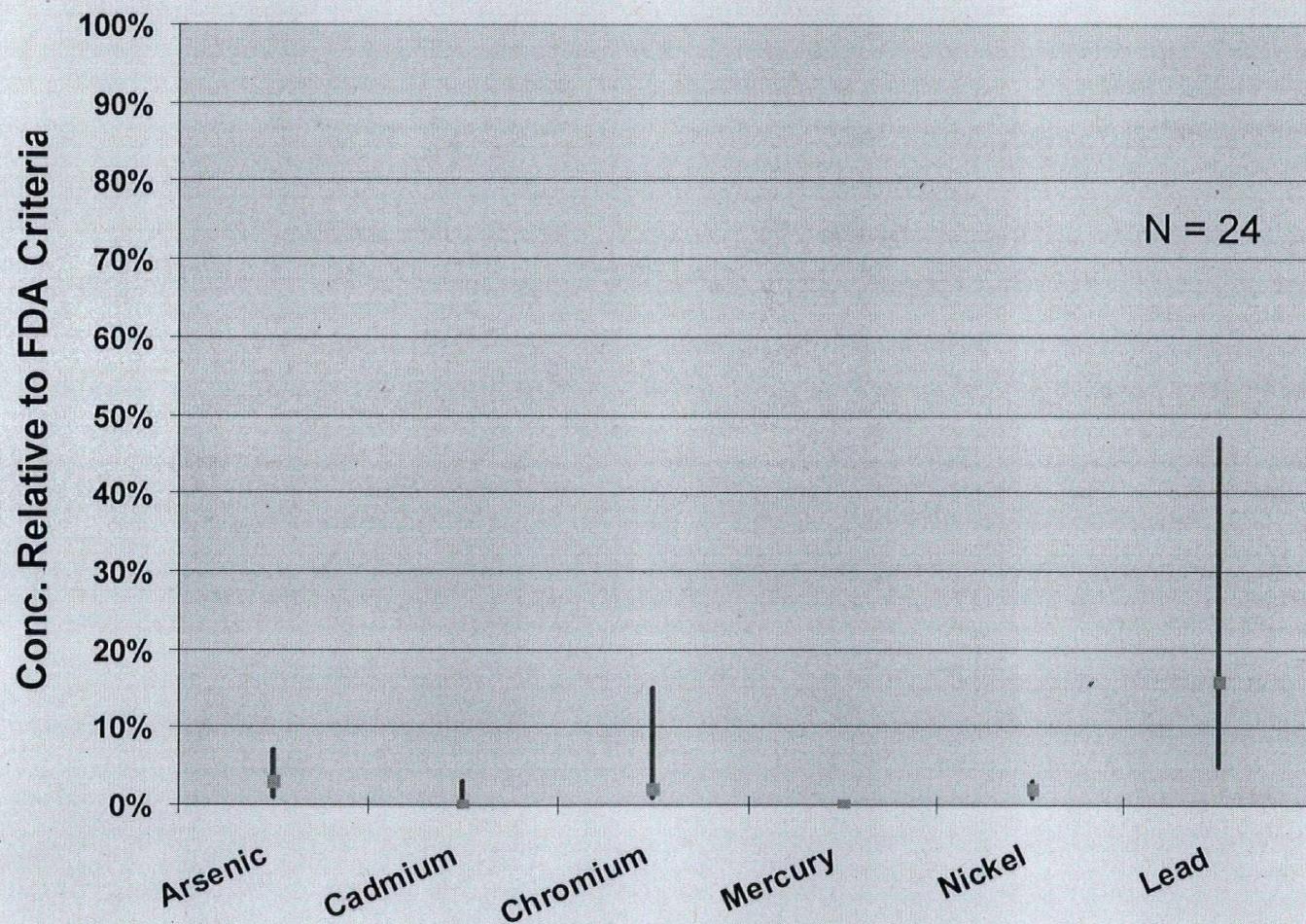
NJDEP (2004-2005)

As Percent of FDA Criteria

Atlantic & Cape May Counties

Parameter	Mean	Min	Max	N
As	3%	1%	7%	24
Cd	0%	0%	3%	24
Cr	2%	1%	15%	24
Hg	0%	0%	0%	20
Ni	2%	1%	3%	24
Pb	16%	5%	47%	24

NJDEP (2004-2005)
As Percent of FDA Criteria
Atlantic & Cape May Counties



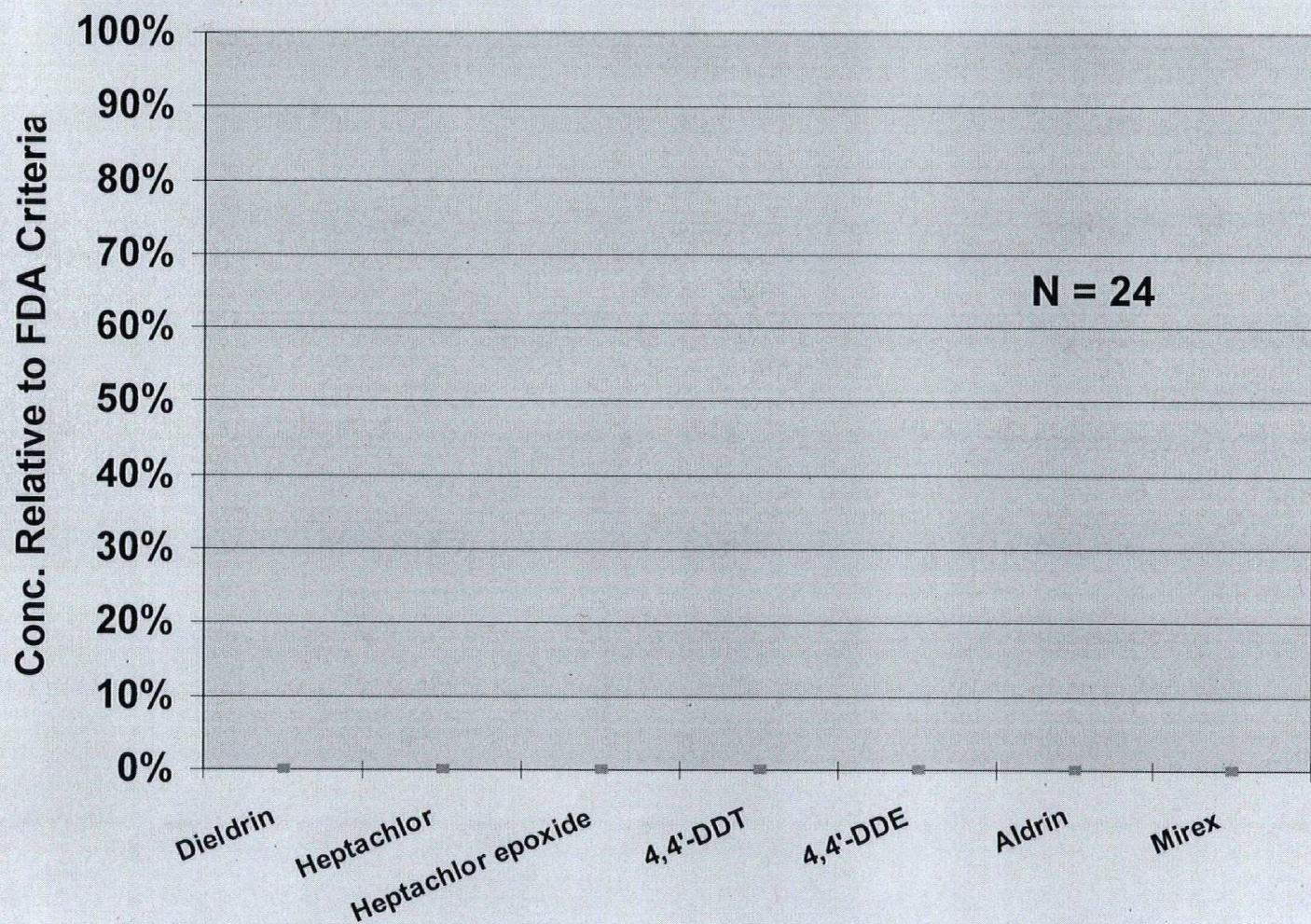
NJDEP (2004-2005)

As Percent of FDA Criteria

Atlantic & Cape May Counties

Parameter	Mean	Min	Max	N
Dieldrin	0.03%	0.00%	0.09%	24
Heptachlor	0.01%	0.00%	0.06%	24
Heptachlor epoxide	0.00%	0.00%	0.00%	24
4,4'-DDT	0.00%	0.00%	0.00%	24
4,4'-DDE	0.00%	0.00%	0.01%	24
Aldrin	0.00%	0.00%	0.00%	24
Mirex	0.00%	0.00%	0.00%	24

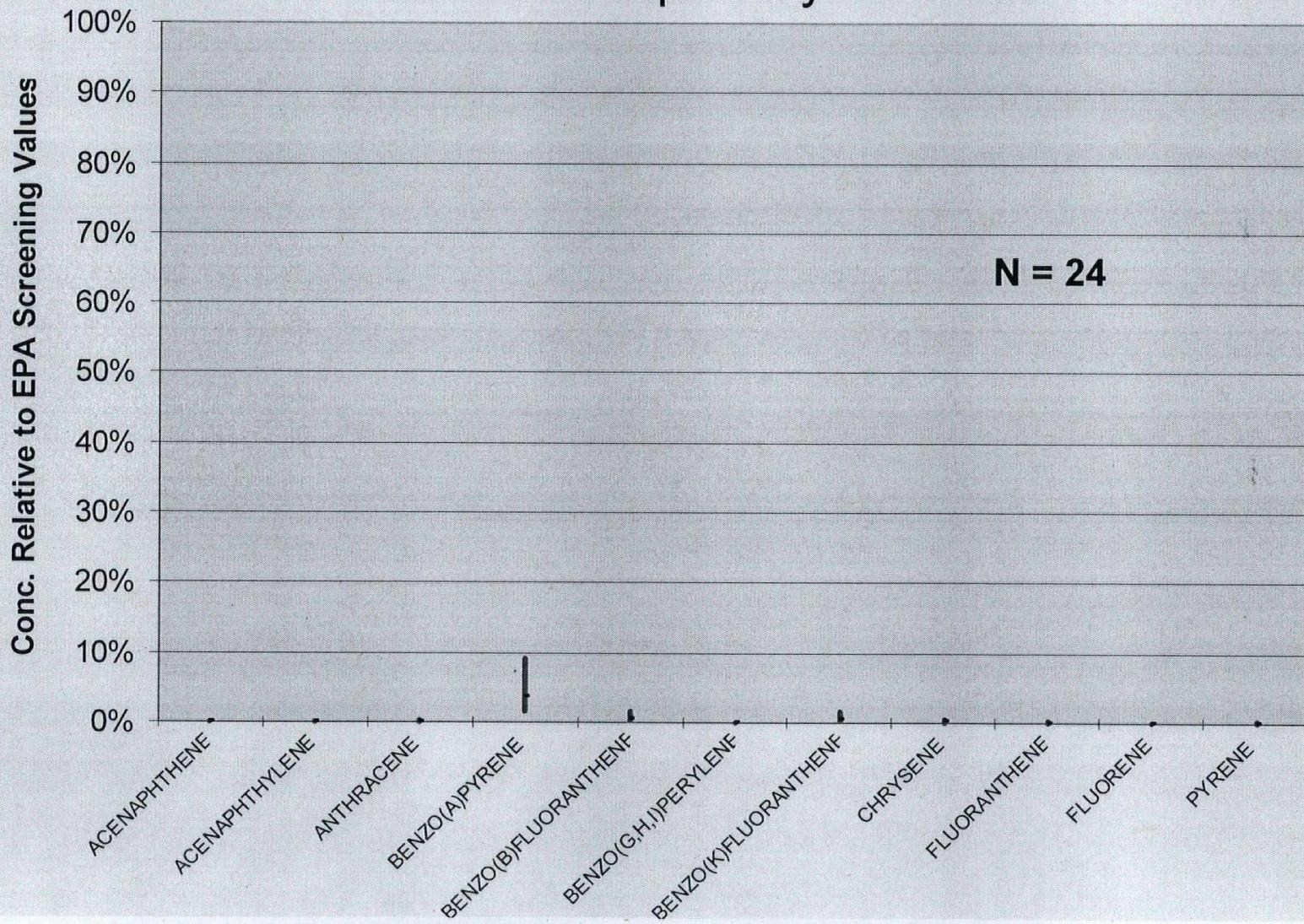
NJDEP (2004-2005)
As Percent of FDA Criteria
Atlantic & Cape May Counties



NJDEP (2004-2005)
As Percent of EPA Screening Values
Atlantic & Cape May Counties

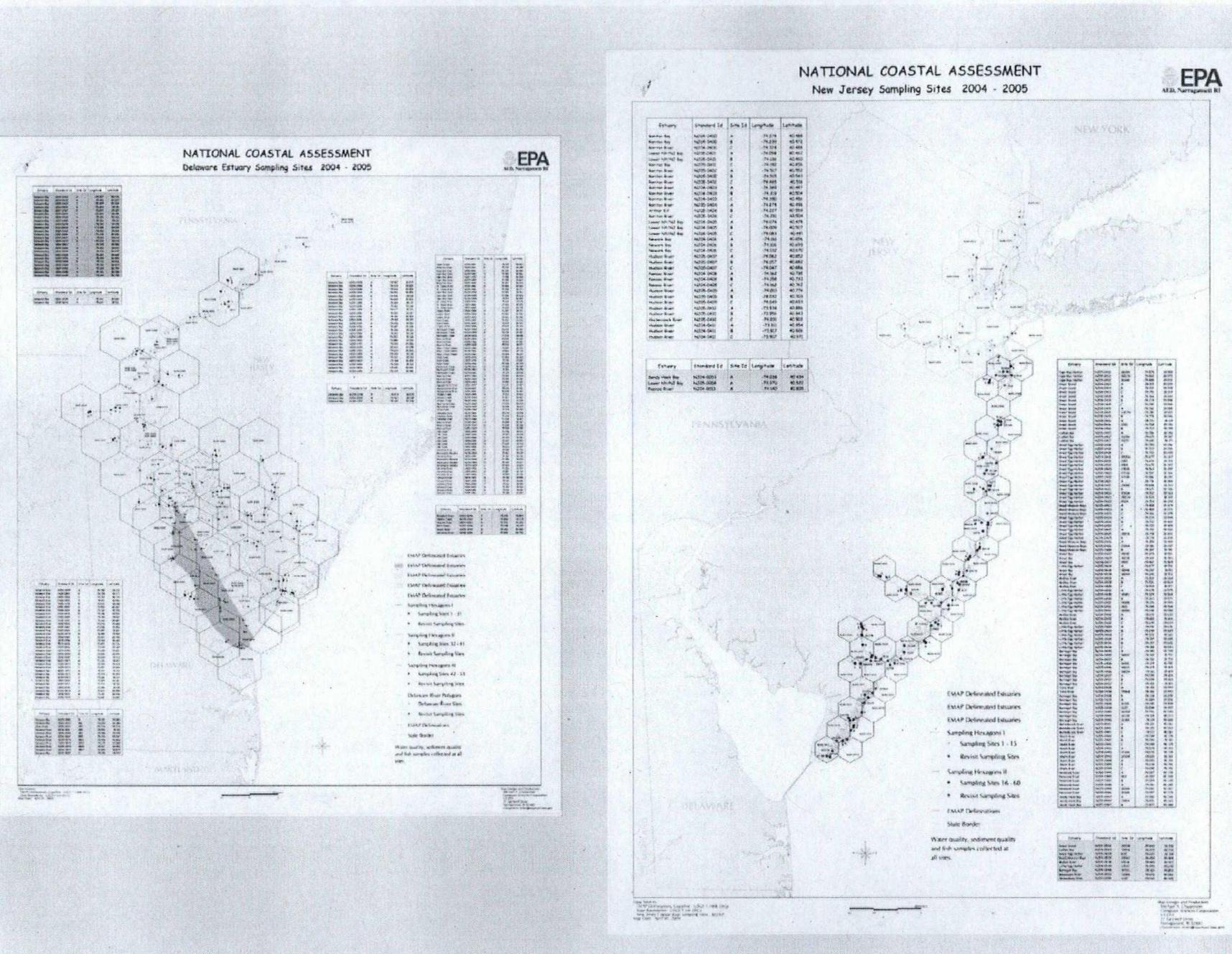
Parameter	Mean	Minimum	Maximum	Count
ACENAPHTHENE	0.01%	0.00%	0.02%	17
ACENAPHTHYLENE	0.00%	0.00%	0.00%	13
ANTHRACENE	0.05%	0.01%	0.22%	24
BENZO(A)PYRENE	3.71%	1.46%	9.14%	10
BENZO(B)FLUORANTHENE	0.59%	0.20%	1.55%	14
BENZO(G,H,I)PERYLENE	0.02%	0.01%	0.03%	7
BENZO(K)FLUORANTHENE	0.57%	0.22%	1.50%	14
CHRYSENE	0.13%	0.05%	0.54%	24
FLUORANTHENE	0.08%	0.02%	0.37%	24
FLUORENE	0.01%	0.00%	0.02%	24
PYRENE	0.05%	0.01%	0.22%	24

NJDEP (2004-2005)
As Percent of EPA Screening Values
Atlantic & Cape May Counties

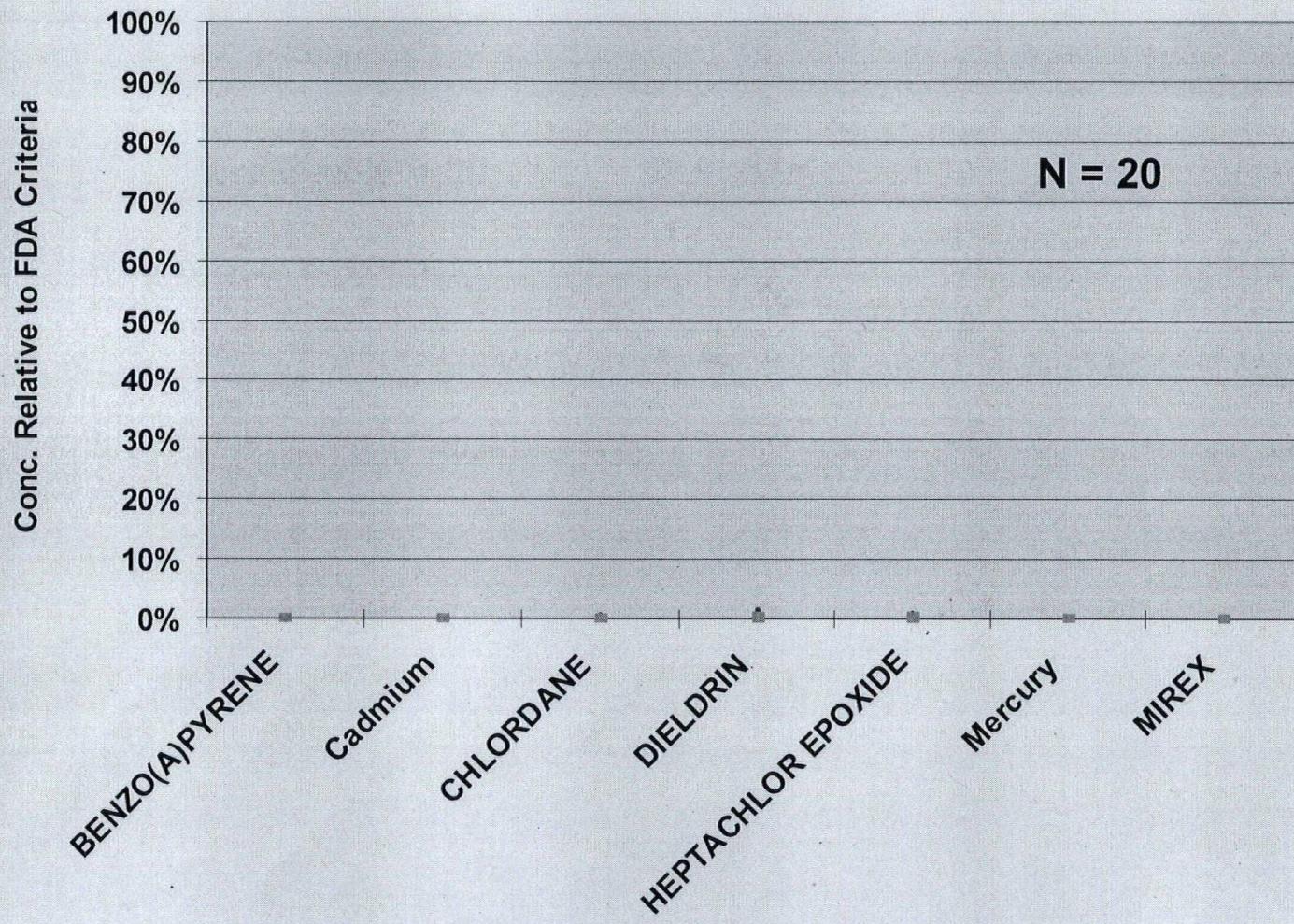


Future Plans

- Extension to all of NJ coastal waters
- Integration with National Coastal Assessment
 - Provides broad coverage
 - Allows correlation with NCA sediment & water quality data



National Coastal Assessment Blue Crab NJ Waters 2000-2001



Summary

- Molluscan shellfish measured to date have in general had toxic pollutant levels well below FDA criteria and guidelines.
- Parameters to watch are the heavy metals, in particular, lead, chromium and arsenic.
- Data available at www.nj.gov/dep/bmw